

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of

Raytheon E-Systems

for an exemption from §§ 25.365(e)(2),
25.562(c)(2) through (c)(4) and (c)(6),
25.785(h)(2), 25.812(e), 25.813(e), and
25.853(d) of Title 14, Code of Federal
Regulations

Regulatory Docket No. 29302

PARTIAL GRANT OF EXEMPTION

By letter dated August 3, 1998, Mr. Paul Sallas, Manager, Designated Alteration Station, Raytheon E-Systems, PO Box 154580, Waco, TX, 76715-4580, petitioned for exemption from the requirements of §§ 25.365(e)(2), 25.562(c)(2) through (c)(4) and (c)(6), 25.785(h)(2), 25.812(e), 25.813(e) and 25.853(d) of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would permit installation of interior doors between passenger compartments, side facing divans, flight attendant seats that do not provide direct view, and interior materials that do not comply with heat release smoke emissions requirements. The proposed exemption is for use on a Boeing Model 777-700 increased gross weight airplane.

The petitioner requests relief from the following regulations:

Section 25.365(e)(2) - Provides minimum opening sizes to be considered when determining decompression loads and venting.

Sections 25.562(c)(2) through (c)(4) and (c)(6) - Establishes human injury criteria for emergency landing dynamic conditions as applicable to side facing divans.

Section 25.785(h)(2) - Requires that flight attendant seats be located to provide a direct view of the passenger cabin.

Section 25.812(e) - Requires floor proximity escape path marking lighting for emergency egress.

Section 25.813(e) - Prohibits installation of interior doors between passenger compartments.

Section 25.853(d) - Limits maximum heat release rates for large panel cabin interior materials.

The petitioner's supportive information is as follows:

“GENERAL BACKGROUND

“The phenomenal growth in the past few years of the so-called executive, VIP, or Head-of-State transport airplane market has clearly tested the fabric of the rules promulgated to insure their safety. Transport Airplane Category rules, FAR Part 25, have evolved over the past three decades in an environment dominated by the emerging commercial carrier industry. It is not, therefore, difficult to understand why new safety standards for transport airplanes promulgated during this period responded to the commercial airline safety concerns associated with conveying large numbers of relatively inexperienced travelers and did not envision the current needs of the private executive operator.

“The Boeing 777-200 IGW configured as described herein is a special purpose airplane modification of the original airline version. The special purpose for this model is to ‘privately’ transport very reduced numbers, usually less than 25% of the airplane’s capacity as normally configured for airline operation, of executives on business or pleasure trips. The importance of the intended ‘private’ use for these aircraft should not be understated in these Petitions for Exemption. The aircraft will be excluded from Part 121 operations and will therefore not be used on a ‘for hire’ basis. In considering the granting of this request the petitioner would accept an FAA requirement to exclude an airplane so configured from Part 121 operations.

“In consideration of the intended private use of this airplane supported by the justifications presented herein, the petitioner requests Exemptions from the following applicable rules:

“1. FAR Part 25.365(e)(2):

‘(e) Any structure, component or part, inside or outside a pressurized compartment, the failure of which could interfere with continued safe flight and landing, must be designed to withstand the effects of a sudden release of pressure through an opening in any compartment at any operating altitude resulting from each of the following conditions:

(2) Any opening in any pressurized compartment up to the size $H_{(o)}$ in square feet; however, small compartments may be combined with an adjacent pressurized compartment and both considered as a single compartment for openings that cannot reasonably be expected to be confined to the small compartment. The size $H_{(o)}$ must be computed by the following formula:

$$H_{(o)} = P * A_{(s)}$$

where,

$H_{(o)}$ = Maximum opening in square feet, need not exceed 20 square feet.

$$P = \frac{A_{(s)}}{6240} + 0.024$$

** $A_{(s)}$ = Maximum cross-sectional area of the pressurized shell normal to the longitudinal axis, in square feet.'*

“Exemption:

“When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the decompression hole size prescribed by FAR 25.365(e)(2).

“General Information:

“As is common in the rulemaking process, the development of rules concerning pressurized cabin loads, specifically those associated with sudden decompression from all causes, have undergone evolutionary changes since their original adoption as CAR 4b.216(c). On August 27, 1980, the FAA adopted changes to FAR 25.365 at Amendment 25-54 in response to recent incidents involving engine disintegration and terrorist actions which could specifically affect the safety of airplanes and its occupants. This rule provided a formula for calculating the decompression hole opening size resulting from a bomb explosion based on the pressurized fuselage diameter. Then on April 2, 1990, Amendment 25-71 was adopted to further recognize the potential hazards of secondary structural damage resulting from a sudden decompression event. Amendment 25-72, which is part of the certification basis for the subject project, was subsequently adopted but did not include additional rulemaking that would affect the present Petition.

“Having outlined the history of 25.365, the current Petition can now be more fully explained. Aircraft configured for airline operations commonly include only a few true ‘compartments’ separated by partitions or bulkheads, notably the cockpit, lavatories, and cargo compartments. All other compartments separating First Class, Business Class, and Coach Class seating are typically divided by light partitions having doors with curtains. On the other hand, executive interior configurations most always include multiple rooms accessible only through privacy doors. The issue arising out of this configuration is that

compliance with 25.365(e)(2) for most executive interiors in wide body aircraft is impractical if not impossible owing to the size of rooms relative to the 20 ft² decompression opening and the designer's inability to provide sufficient venting area to prevent ceiling and wall overloads due to pressure differentials between adjacent compartments. Prior to the adoption of Amendment 25-54, executive interior modifiers considered only a window blowout as the most probable opening size in such compartments and even then struggled to find sufficient space for ventilation that would result in reasonable wall and ceiling loads. A reasonable rule of thumb is that the designer should provide approximately four times the blowout area in the subject room for intercompartmental venting to achieve sensible wall and ceiling loads. It is clear that one simply cannot provide 80 ft² of ventilation in most rooms found in wide body aircraft executive interiors.

“Justification and Safety Considerations:

“Though the new rules promulgated in Amendments 25-54 through 25-72 were not limited to air carrier operations, the incidents that precipitated their adoption were clearly of that type. Although the final language of the rule did not reflect the actual reason for these changes as outlined in the Preamble material accompanying rule adoption, among several other noted considerations it is obvious that these sweeping changes recognized the potential hazard to the airplane and its occupants resulting from bomb explosions initiated by terrorist activity. To objections offered by many commenters to the proposed rule it is worthwhile in understanding the intent of the rulemaking to quote FAA from the Preamble to Amendment 25-54 regarding bomb explosions - ‘The FAA notes that, ultimately, minimizing the loss of airplanes as a result of bomb explosions is a ground security problem.’ It is apparent that this comment was in response to objections by air carrier operators. And it is to this issue that private operators of airplanes having executive interiors must seek regulatory relief using as a compensating basis the nature of their operations. That is, the petitioner agrees that protecting these aircraft from bomb explosions is indeed, to quote the FAA, ‘a ground security problem.’ And what better way could an airplane be protected from such terrorist activities than to be used in a private operation by individuals well known to the operators?

“The petitioner therefore contends that the operational nature of these executive airplanes is an ameliorating factor with regard to potential hazards associated with internal structural loads due to cabin decompression. The petitioner proposes that the blowout area formula found in 25.365(e)(2) be replaced by a more rational opening area for this application. Since every door in the Boeing 777-200 is of the plug-type and includes very reliable latching, it is also reasonable not to include such openings in the decompression evaluation.

“On the other hand, many rooms in the subject floor plans include passenger windows and some near the wing-mounted engines would be subject to damage due to engine disintegration. To that end, the petitioner proposes to analyze the configuration for decompression events arising out of either a passenger window failure or discrete damage due to engine disintegration and to show that all ceilings, floors, and walls are capable of

withstanding this ultimate load and, further, that no structural deflections or other secondary damage would result in a hazardous condition. It is believed that this request recognizes the safety issues involved and offers compensating measures which provide a level of safety equal to that required by the original rule.

“2. FAR PART 25.562(c)(2) through (c)(4):

‘(c) The following performance measures must not be exceeded during the dynamic tests conducted in accordance with paragraph (b) of this section:

(2) The maximum compressive load measured between the pelvis and the lumbar column of the anthropomorphic dummy must not exceed 1,500 pounds.

(3) The upper torso restraint straps (where installed) must remain on the occupant's shoulder during the impact.

(4) The lap safety belt must remain on the occupant's pelvis during the impact.’

“Exemption:

“When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the human injury criteria of FAR 25.562(c)(2) through (c)(4) and (c)(6) for side facing divans but required to meet the head injury criteria of FAR 25.562(c)(5).

“General Information:

“When Amendment 25-64 and later rules were promulgated, side facing divan (sofa) installations were not adequately considered for Transport Category Airplanes. With the sudden growth in the VIP or executive transport airplane market the side-facing seat and divan configurations have become quite common. Considering the specific human injury criteria embodied in FAR §§25.562(c)(2) through (c)(6) together with §25.785(d) it is clear that application of the referenced regulations to side facing divans with multiple occupants does not result in an equivalent level of safety as afforded the occupant of either forward or aft facing seats. Strict compliance with the referenced regulations has been determined to be neither practicable nor desirable for the subject application. The only recourse for applicants with similar configurations who desire FAR certification of their interior modification is through exemption to the general injury requirements of 25.562(c)(2) through (c)(4) and (c)(6) as invoked by §25.785(b).

“This Petition for Exemption offers certain measures intended to achieve an equivalent level of safety to that intended by the applicable regulations, giving consideration to the intended use of the Boeing Model 777-200 IGW for executive transport.

“Justification and Safety Considerations:

“Of the human injury criteria currently included in §§25.562(c)(2) through (c)(6), the petitioner feels the single most critical criterion because of the high potential for occupant death, and the one for which the petitioner feels can most practically be dealt

with considering the current state of design technology, is the Head Injury Criteria (HIC) in §25.562(c)(5).

“In light of these considerations and following the petitioner’s conclusion that compliance with the HIC requirements is practical for the requested seating arrangement, it is proposed that the divans be tested to show compliance with the 14g and 16g requirements of §25.562(b) and the HIC requirement of §25.562(c)(5) but that the remaining occupant injury criteria of §§25.562(c)(2) through 25.562(c)(4) and (c)(6) be waived. The petitioner believes that exclusion of the excepted rules and retention of some head strike requirement such as §25.562(c)(5) is appropriate for an airplane having the special purpose discussed herein and offers an acceptable level of safety for the most severe type of injury commonly experienced where occupant death occurs.

“The specific means that the petitioner proposes to use for compliance with the HIC requirement of §25.562(c)(5) is to remove by design all potential body-to-body and body-to-structure/furnishing contact (except for padded bulkheads just forward of a side-facing occupant) so that no such impacts could occur during the dynamic loading tests required by §25.562(b). Each divan side-facing seat location that is occupiable during taxi, takeoff, and landing operations would be equipped with a safety belt and shoulder harness and the divan would be placarded accordingly for use during taxi, takeoff, and landing operations to prevent contact of the occupant with structure/furnishings or another occupant in a farther forward position. Any side-facing divan configuration where an occupant is adjacent to a forward bulkhead would be tested using representative bulkhead construction including padding. It is also proposed that all testing of the divans be in accordance with the applicable portions of §§25.561 and 25.562, except those rules specifically excluded by this proposal, using Anthropomorphic Test Dummies (ATD) in their appropriate taxi, takeoff, and landing positions.

“3. FAR Part 25.785(h)(2):

‘(h) Each seat located in the passenger compartment and designated for use during takeoff and landing by a flight attendant required by the operating rules of this chapter must be:

(2) To the extent possible, without compromising proximity to a required floor-level emergency exit, located to provide a direct view of the cabin area for which the flight attendant is responsible.’

“Exemption:

“When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the flight attendant viewing requirement of FAR 25.785(h)(2) except that voice contact with all passengers would be maintained.

“General Information:

“The most common design feature found in executive interiors is the ‘privacy area.’ Compartmentalizing airplanes into rooms introduces several certification challenges. Owing to this compartmentalization, a certification issue often arises with regard to flight attendant viewing of passengers. In order to transport the desired number of passengers, it is often necessary for some passengers to occupy rooms during taxi, takeoff, and landing operations that are remote from emergency exits.

“As is frequently the case in less densely occupied executive interior arrangements, there exists an excess of emergency exits, the low passenger levels require only a very limited number of flight attendants according to FAR 91.533(a)(1), and rooms tend to limit direct passenger viewing by the required flight attendants. It would seem that the applicable rules clearly give priority to the flight attendant’s duty to be near an emergency exit and secondarily to passenger direct viewing.

“Justification and Safety Considerations:

“As stated above, seating arrangements for large transport category executive type aircraft are often not conducive to direct viewing of every passenger by flight attendants because of the lack of density seating in the cabin area and the requirement to give proper consideration to the flight attendants’ primary responsibility of proximity to the floor level emergency exits. However, the language of §25.785(h)(2) does not require full viewing of every passenger as indicated by the words ‘to the extent possible, without compromising proximity to a required floor level exit.’ It is worthwhile to note that if this same airplane were limited to 19 passengers, no flight attendant would be required and, therefore, no direct viewing requirement would be in effect.

“The petitioner contends that the subject interior arrangement offers proper consideration to the flight attendants’ responsibilities without compromising either proximity to the required emergency exits nor direct viewing of the majority of the cabin occupants. It is believed that if this arrangement is not in strict compliance with §25.785(h)(2), it provides a measure of safety equivalent to that intended by this regulation. The small number of passengers combined with the largely open seating arrangement provides an improved level of passenger awareness which results in increased flight attendant awareness. Although some seated passengers may not be observable by any flight attendant, each is in easy voice contact with at least one flight attendant. Finally, because of the use for which this airplane is intended, the degree of viewing and the level of familiarity with the airplane and its occupants by the flight attendant crew will be greater than it would be if the airplane were operated in an air carrier configuration where direct

viewing of some passengers is frequently blocked either by bulkheads or the seat backs themselves.

“4. FAR Part 25.812(e):

‘(e) Floor proximity emergency escape path marking must provide emergency evacuation guidance for passengers when all sources of illumination more than 4 feet above the cabin aisle floor are totally obscured. In the dark of the night, the floor proximity emergency escape path marking must enable each passenger to -
(1) After leaving the passenger seat, visually identify the emergency escape path along the cabin aisle floor to the first exits or pair of exits forward and aft of the seat; and
(2) Readily identify each exit from the emergency escape path by reference only to markings and visual features not more than 4 feet above the cabin floor.’

“Exemption:

“When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the floor proximity emergency escape path marking requirements of FAR 25.812(e) as it relates to ‘rooms.’

“General Information:

“FAR §25.812(e) requires ‘Floor proximity emergency escape path marking must provide emergency evacuation guidance for passengers when all sources of illumination more than four feet above the cabin aisle floor are totally obscured.’ FAR §25.812(e)(1) adds further specificity to the requirement by stating, ‘After leaving the passenger seat, visually identify the emergency escape along the cabin aisle floor to the first exits or pair of exits forward and aft of the seat.’

“It is clear from the language of §25.812(e) that this rule envisioned an application to ‘standard’ airline seating arrangements and did not anticipate executive arrangements that are characterized by multiple ‘rooms’ or compartments. Since these ‘rooms’ by their nature, more resembling living rooms in homes or board rooms in executive offices, do not typically include ‘aisles’ as such, strict application of the rule is not possible in such instances. Petition 5. addresses a related matter regarding doors on such rooms and it is requested that Petition 5. be accepted in conjunction with the Petition requested herein.

“Although, the language of §25.812(e) would seem to prevent compliance for airplanes having the aforementioned executive interior arrangements, this Petition seeks an alternate means of compliance that is believed to satisfy the level of safety intended by §25.812(e).

“Justification and Safety Considerations:

“The petitioner believes that to achieve a level of safety equal to that intended by §25.812(e) it must be substantiated that a passenger seated in any seat designated for occupation during taxi, takeoff, and landing operations is provided adequate floor-level lighting to visually identify escape paths from their seat and readily identify each emergency exit along the escape path by reference only to markings and visual features not more than four feet above the cabin floor in the dark of night.

“Considering the language of §25.812(e) it is nevertheless believed that strict compliance can be shown in areas of the subject airplane typical of ‘aisle ways’ and an equivalent level of safety can be offered in ‘rooms’. It is obvious that in areas designated as ‘rooms’ occupants could become confused unless the egress lighting is very simple and provides a level of awareness of the egress path that cannot be misleading. But a point which also cannot be overlooked is the importance of a passenger evacuation pre-flight briefing. This too would be part of the showing of equivalency. In those areas that present normal ‘aisles’ or pathways common to airline configurations or hallways typical of executive interiors it is proposed that standard pathway floor proximity lighting be utilized. These pathways will be treated as and referred to as ‘main’ aisles. For a room where well-defined aisles do not exist and a door or doors separate it from main aisles, it is proposed that sufficient floor level ‘flood’ lighting be provided below the four foot level to clearly identify escape paths out of the room into one or more main aisles. Each room exit would incorporate an approved ‘Exit’ sign which would be visible below the four-foot level. Finally, it is proposed that a simulated night-time evacuation demonstration be conducted to show that a ‘naive human subject’ as defined in Advisory Circular 25.812-2 has sufficient visual information to safely depart the subject rooms into the strictly compliant main aisles. In summary, the petitioner proposes the following steps to provide the desired level of safety:

“1. Passenger pre-flight briefing and cards specifically describing the evacuation route from each room to the nearest emergency exits.

“2. Room lighting visible below the four foot level that, without confusion, clearly directs each occupant to a room exit and out into an aisle. Each room emergency egress lighting scheme would be designed to accommodate its unique arrangement. However, every room exit will incorporate an exit sign placed no more than four feet above the floor.

“3. A simulated night-time evacuation demonstration of each room using the guidance contained in Advisory Circular 25.812-2 will be used as the final showing of safety.

“The petitioner contends that these design and operational measures combined with an actual demonstration of the evacuation capability of this configuration assures the level of safety intended by the referenced regulation.

“5. FAR Part 25.813(e):

‘(e) No door may be installed in any partition between passenger compartments.’

“Exemption:

“When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the interior door prohibition of FAR 25.813(e) except that door position indication will be provided.

“General Information:

“In the years just prior to the recodification of CAR 4b into FAR 25 the CAA issued NPRM 63-42 (28 FR 11507, October 23, 1963) which was proposed in an effort to achieve improved crashworthiness for Transport Category Airplanes. However, before the conclusion of the public rulemaking process concerning these issues was complete all of the former CAR 4b rules were recodified into FAR 25 on December 24, 1964 (29 FR 18289). Those rules were essentially those found in the former CAR 4b and did not incorporate any of the crashworthiness proposals of NPRM 63-42. However, shortly after this recodification the FAA issued Amendment 25-1 (30 FR 3204, March 9, 1965) which incorporated NPRM 63-42 crashworthiness proposals originally intended for incorporation into CAR 4b.

“Included in the crashworthiness measures incorporated by Amendment 25-1 was §25.813(e) which read, ‘No door may be installed in any partition between passenger compartments.’ That rule stands today and is a prohibition against doors in partitions separating ‘passenger compartments.’ Interestingly enough, §25.813(d) states, ‘If it is necessary to pass through a passageway between passenger compartments to reach any required emergency exit from any seat in the passenger cabin, the passageway must be unobstructed. However, curtains may be used if they allow free entry through the passageway’ and §25.813(f) reads, ‘If it is necessary to pass through a doorway separating the passenger cabin from other areas to reach any required emergency exit from any passenger seat, the door must have a means to latch it in open position. The latching means must be able to withstand the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, listed in §25.561(b).’

“The petitioner offers that the purpose of these rules was clearly an effort to prevent the obstruction of doorways or passageways leading to any required emergency exit even after the aircraft has been subjected to the ultimate inertia forces, relative to the surrounding structure, listed in § 25.561(b). It is also felt that the promulgators of these rules were envisioning the relatively high seating density encountered in normal airline interior configurations where passengers may not be very familiar with their surroundings. However, it is not felt that the rule, although strictly applicable, envisioned the type of interiors typically found in what are referred to as executive configurations. The interiors of these airplanes are commonly divided into multiple compartments or rooms with doors to permit a measure of privacy. It is clear that these

doors could conceivably be in an emergency egress path. Under the subject rule if such a doorway was in a non-occupiable compartment for taxi, takeoff, and landing operation (i.e. not a passenger compartment), it would be acceptable but the door must have a means to latch it in open position and remain open after the aforementioned ultimate loads are applied (§25.813(f)). On the other hand, if the same room had just one occupant, there could be no door (§25.813(e)).

“Justification and Safety Considerations:

“The petitioner believes that to achieve an equivalent level of safety intended by §§25.813(d)-(f) it must be substantiated that any passageway or doorway leading to a required emergency exit cannot be obstructed under any taxi, takeoff, and landing operation irrespective of the compartment configuration but including the condition imposed upon the doorway when it is subjected to the ultimate inertia forces, relative to the surrounding structure, listed in § 25.561(b). Of course, this interpretation is not strictly in accordance with §25.813(e) which expressly forbids doors between passenger compartments.

“Having summarized the specific issues facing this interior arrangement, the petitioner proposes the following design measures, features, and analysis that are believed would result in an equivalent level of safety to §§25.813(d)-(f). First, all internal cabin doors in emergency egress routes would be securely latched open during taxi, takeoff, and landing operations (and placarded accordingly) and would be shown to be capable of withstanding the aforementioned ultimate inertia loads. Second, each door on an occupied room in an egress route will be equipped with position sensing and a crew light to alert the crew if any subject door is unlatched any time the seat belt signs are illuminated. Third, the petitioner proposes to complete an evacuation analysis substantiating that all passengers and crewmembers can be evacuated from the airplane within the time prescribed by §25.803.

“The petitioner contends that these design measures combined with an analytical substantiation of the evacuation capability of this configuration assures a level of safety equal to that intended by the referenced regulations.

6. FAR Part 25.853(d):

‘(d) Except as provided in paragraph (e) of this section, the following interior components of airplanes with passenger capacities of 20 or more must also meet the test requirements of parts IV and V of Appendix F of this Part, or other approved equivalent method, in addition to the flammability requirements prescribed in paragraph (a) of this section:

- (1) Interior ceiling and wall panels, other than lighting lenses and windows;*
- (2) Partitions, other than transparent panels needed to enhance cabin safety;*
- (3) Galley structure, including exposed surfaces of stowed carts and standard containers and the cavity walls that are exposed when a full complement of such carts or containers is not carried.’*

“Exemption:

“When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the interior material heat release requirements of FAR 25.853(d).

“General Information:

“Airplane post-crash fire safety has been a significant concern to the FAA, its predecessor CAA, and the industry since the close of World War II when the numbers of people who were enjoying the benefits of air carrier service began a dramatic rise that continues to this day. The changes in the rules starting with rudimentary horizontal material flammability tests promulgated in CAR 4b until today’s FAR 25 rules requiring 65/65 heat release testing have followed the unfortunate post-crash fire incidents experienced as a result of major air carrier crashes. The FAA and industry alike have worked together to improve airline safety and these cooperative efforts have resulted in the standards now in place in FAR §25.853 for transport category airplanes.

“A careful study of the development of these rule changes reveals that a steady improvement in cabin fire safety occurred as a result of implementation of these rules because we were gaining a better understanding of the post-crash fire scenario. It is worthwhile to read and understand the reasoning of those who came before us and our contemporaries regarding the issue of fire safety. And there is no better way to do this than to review FAA Reports and NPRM citations. While the petitioner will not cite these here, their references will be cited for those interested in knowing the reasoning behind the rules. The following references will be useful for this purpose:

“NPRM 69-33 (34 FR 13036; August 12, 1969)
ANPRM 74-38 (39 FR 45044; Dec. 30, 1974)
NPRM 75-3 (40 FR 6505; February 12, 1975)
NPRM 75-31 (40 FR 29410; July 11, 1975)
FAA Report FAA-ASF-80-4 (SAFER)
NPRM 84-5 (49 FR 21010; May 17, 1984)
NPRM 84-11 (49 FR 31830; Aug. 8, 1984)
NPRM 84-21 (49 FR 47358; Dec. 3, 1984)
NPRM 85-10 (50 FR 15038; April 16, 1985)
Amdt. 25-61 (51 FR 26206; July 21, 1986)
NPRM 90-12 (55 FR 13886; April 12, 1990)
Amdt. 25-83 (60 FR 6616; Feb. 2, 1995)

“With the sudden growth in the VIP or executive transport airplane market together with the simultaneous introduction of more stringent interior material flammability standards, aircraft interior modifiers have been faced with a serious dilemma in resolving the styling requirements of the private aircraft owner/operator of these executive aircraft and the flammability requirements imposed by §25.853. For the most part, modifiers have been able to simultaneously satisfy both the styling and interior material flammability

requirements of §§25.853(a) and (c) with great effort and diligence; however, many of the materials required in these aircraft interiors simply cannot pass the 65/65 heat release requirement of §25.853(d) no matter how diligent the designer is. It is not within the grasp of current technology to make certain natural materials conform to these standards and the owners of these airplanes define, in fact demand, the use of these materials. It should be understood that these aircraft must be outfitted in a style not unlike fine executive board rooms or luxurious residences to satisfy their private users.

“Justification and Safety Considerations:

“Having reviewed the evolution of the interior material flammability rules cited above, the petitioner believes most readers would arrive at the same conclusion we have. The vast majority of these rules were driven by the post-crash fire experiences in airline operations. The 65/65 heat release regulation was specifically developed to reduce the likelihood of the flash-over phenomenon which was proven by tests to be a prime contributor to the rapid propagation of post-crash cabin interior fires and the generation of blinding smoke. Rapid fire propagation combined with the relatively slow rate of passenger evacuation from densely packed air carrier airplanes has proven to be a deadly combination during actual airline accidents. Throughout the citations that ultimately resulted in the promulgation of these rules is one common theme. As late as 1995 the FAA restated a continuing point that every previous citation stressed when in Amendment 25-83 (60 FR 6616; February 2, 1995), the FAA states:

‘Summary: These amendments clarify standards adopted in 1986 [Amdt. 25-61] concerning the flammability of components used in cabins of certain transport category airplanes. This action is taken to preclude costly, unintended changes to airplane interiors. The clarifications, *which are applicable to air carriers, air taxi operators and commercial operators*, as well as manufacturers of such airplanes, will result in more appropriate, consistent application of those standards.’ [emphasis added]

“It seems very evident from this recapitulation of the current flammability standards which have evolved since the late 1960s that the FAA’s intent and primary thrust was to improve cabin fire safety for ‘commercial carriers’ and these regulations were specifically not intended to overburden private operators and designers of transport category airplanes configured for VIP or executive use. Why the language of the final rules do not clearly reflect this intent was quite probably a matter of rulemaking expediency but could have just as well been done to elicit the very kind of dialog currently being undertaken for this type of aircraft operator. History has proven that rules are often written so that they can provide the greatest benefit relative to safety while permitting interpretive processes to adjust for changing applications. This may well be the case with the flammability rules because the majority of today’s VIP configured transport category airplanes simply cannot comply with the 65/65 heat release requirement for many of its materials. Regrettably, the market for U.S. Type Certificated executive configured large transport aircraft (more than 20 passengers) requiring U.S. registry has been dramatically slowed because modifiers could not comply with the subject flammability rules. This has not only been an economic burden for U.S.

modifiers and operators but has sometimes resulted in ‘Field Approvals’ of strictly noncompliant airplanes by unsuspecting modifiers or registration of aircraft in foreign countries that do not require compliance. In any event, this is an unacceptable situation to be perpetuated.

“The petitioner offers that the subject airplane modification presents certain design features and operational characteristics that compensate for the lack of strict compliance with §25.853(d). A review of the 65/65 heat release test requirements which reflect criteria that are characteristic of flash-over conditions indicates a critical correlation between both time (2 minutes) and peak rate of heat release and heat flux. The designer then should have two rather than just one design element at his discretion when considering the flash-over phenomenon. Since it is clear that material selection is being controlled by aesthetics in this application, the modifier cannot exercise any real control over the actual heat release but the exposure time to this heat release is still within the designer’s control. Therefore, it is proposed as a first step in mitigating the fire hazard that an evacuation analysis be performed to show that all souls on board can be safely evacuated in less than 70 seconds. This would be possible because of excess emergency exits for the airplane passenger capacity, thirteen flight attendants, and smooth evacuation routes. The petitioner feels that developing such substantiation data provides documentation supporting an equivalent level of safety to that intended for air carriers required to comply with §25.853(d). In addition, the petitioner proposes to test each applicable material in accordance with FAR 25, Appendix F, Part IV, as required by §25.853(d) and document the results in a report.

“The petitioner considers the compensating factors in the subject design together with the reduced evacuation time to be of such significance as to make compliance of the design equivalent to the intent of §25.853(d).

“Public Interest:

“Granting these Petitions for Exemption is clearly in the public interest as it would permit the efficient transport of executives and Heads of State in an environment which would otherwise be impossible without this relief and, as evidenced by the petitioner’s arguments contained herein, is both safe and essential to the growth of a world economy in which the United States must strive to remain a dominate force. The petitioner is one of the world’s leading modifiers of large transport category executive and Head of State airplanes, provides jobs for thousands of engineers, technicians, and subcontractors, and is committed to remaining the leading outfitter of large transport airplanes with executive interiors. However, to continue this effort it is imperative that the petitioner be granted the regulatory relief requested herein. Failure to achieve this goal will result in billions of lost dollars in domestic and foreign trade for the United States, the petitioner, and the intended operators of these airplanes.

“Exception to Publication of Summary and Relief from 120 Day Notice Requirement:

“The petitioner requests these Exemptions to be granted within 45 days of receipt of the subject Petition by the Transport Aircraft Directorate. Following is a showing of good cause in support of this request:

“1. With regard to the timely filing of petitions for exemption in accordance with 14 CFR Part 11, §11.27(j)(3)(iii), the petitioner contends that all procedures were properly followed in this process by first seeking compliance through means of equivalent safety as strongly encouraged by the FAA (see citations found in FAA Orders 8100.5, paragraph 408, and 8110.4A, paragraph 14.h.). Initial formal written contact with the petitioner’s Project ACO ASW-150 was made on January 17, 1998, and a letter of intent for the subject project citing the need for findings of equivalent safety was provided on March 31, 1998. The petitioner also met with ASW-150 personnel on July 14, 1998, for a briefing on the equivalent safety requests submitted to them and requested a meeting with the Transport Airplane Directorate. However, all of these events followed initial informal meetings between the petitioner and ASW-150 personnel in October 1997 regarding all of the executive interior compliance issues that the petitioner knew would be present in the next few years. Finally, in a meeting on July 29, 1998, with Transport Airplane Directorate staff the petitioner was formally advised of their decision to deny any consideration of equivalent safety requests in accordance with FAR 21.21(b)(1) for the subject regulations and applications.

“2. The petitioner will encounter significant economic loss owing to delivery delays and/or contract terminations if not granted the requested relief within 45 days. Details of these financial matters were reviewed with Transport Airplane Directorate staff in a meeting held on July 29, 1998 in the FAA TAD office.

“3. The Transport Airplane Directorate has for at least a year been aware of these issues and has been considering changes to these regulations to accommodate the growing public interest in executive interiors for transport category airplanes.

“4. In light of the urgency of these Petitions and in acknowledgment of FAA’s long-term goal to develop a Special Federal Aviation Regulation in response to the recognition of this requirement, the petitioner contends that the 45-day notice for granting these Petitions can most effectively be achieved if granted under the waiver prescribed in 14 CFR Part 11, §11.27(j)(3)(ii).”

The FAA determined that publication would not delay processing of this petition and therefore a summary of the petitioner’s request for exemption was published in the Federal Register on August 24, 1998 (63 FR 45104). One comment was received in support of the petition from another division of the petitioner’s parent company.

The FAA's analysis/summary is as follows:

Rapid Decompression:

Regarding the relief requested from § 25.365(e)(2), the petitioner notes that operational considerations (the airplane will be used as an executive airplane) would provide an equivalent level of safety for the required Ho opening. It was noted that the probability of a bomb placed on such an airplane would be very low, so as not to warrant consideration. However, bombs are not the sole reason for the Ho opening. The Ho opening was intended to account for decompressions, including those caused by bombs, which were not addressed by §25.365(e)(1) and (e)(3). While the security measures relative to the airplane may prevent potential bombings, there is no regulatory way of assuring such measures will be in place at all times. In addition, other potential causes of fuselage rupture are possible which are unrelated to the type of operation. The FAA therefore does not agree with the petitioner that a reduction in the structural requirements can be justified based on the operational characteristics of the airplane.

As noted by the petitioner, the regulations regarding cabin safety have become much more stringent over the years, and generally increased the cost of certification. These requirements tend to have a greater impact on the privately operated transport segment, since the high degree of customization results in fewer opportunities to amortize costs. It should be noted that, while characteristic of this type of operation, the increased costs are only partially due to the requirements and largely due to preferences of the customers. While it is true that the major impetus for most of these changes is commercial operation, it is incumbent upon the FAA to upgrade design safety as the state of the art progresses, irrespective of the type of operation.

The issue of transport category airplanes operated in private use is one that the FAA is giving great attention. There are several regulatory requirements, including some identified by the petitioner, that lend themselves to consideration for modification when looking at the differences between commercial and private use operations. The FAA intends to summarize its views on these regulations and, ultimately, propose modifications to the requirements, where appropriate. It may be that the regulations that are the subject of this petition are included in the proposed modifications, and that additional design flexibility can be offered, when certain circumstances are met. This issue is not resolved at this time, however, and the particular interior in question must be addressed on its own merits.

Side Facing Divans:

The petitioner has requested relief from certain of the occupant injury criteria of § 25.562, but proposes to show compliance with § 25.562(c)(5). In fact, the sections for which relief is requested are the most straightforward and well understood for side-facing divans. The FAA has acknowledged that there are not, at present, injury criteria to demonstrate an equivalent level of safety for the occupants of multiple occupancy side-facing divans. For this reason, the FAA has published criteria that could be used in

support of a petition for exemption from the requirements of § 25.785 for general injury protection. Because the 777-200 certification basis includes Amendment 25-64, these criteria are applicable.

The FAA does not consider the sections for which exemption is requested to be unique to side-facing seats in general, or divans in particular. In fact, compliance has been shown with these sections on other projects. Therefore, an exemption for the sections requested is not justified. With regard to the general injury protection requirements of § 25.785, the FAA agrees that the current understanding of the relevant injury mechanisms is not sufficient to ensure an equivalent level of safety. At the same time, the FAA recognizes that side-facing seats are a typical component of private use airplanes, and to discontinue their use in the absence of available criteria would be a severe burden. Therefore, an exemption can be granted, provided the criteria noted below are complied with.

Although not explicitly requested, the FAA is addressing the exemption to § 25.785(b), rather than § 25.562, since it is this section that requires the same level of protection for occupants of all seats. In November of 1997, the FAA issued a memorandum containing guidance regarding certification of side-facing seats. This memorandum included a draft issue paper that contained detailed test criteria that could be used to support a petition for exemption from the general occupant safety requirements of § 25.785. While the FAA has acknowledged that these criteria may not provide a precisely equivalent level of safety as compared with occupants of forward or aft facing seats, the criteria are considered to represent the best advice available today. Furthermore, these criteria are considered reasonable and within industry's capabilities. Thus, the FAA expects that any petition for exemption regarding side-facing seats would apply the criteria provided in the November 1997 memorandum. Although the petitioner has not proposed that criteria, and has offered no alternative criteria, the FAA has added the basic requirements to the provisions of this portion of the exemption. A copy of the November 1997 memorandum, which contains the detailed criteria, is attached to this exemption for reference.

Flight Attendant Direct View:

The petitioner has identified the requirement for flight attendant seats to be located to provide a direct view of the passenger cabin as not practical for compliance with the executive type interior to be used on the 777-700. The complexity of the interior arrangement, coupled with the need to retain proximity to emergency exits, is cited as the primary reason that compliance is impractical. The petitioner also notes that under the provisions of § 91.533, flight attendants are not required for passenger capacities of 19 or less. In addition, the petitioner contends that the passengers on this airplane will have a higher degree of familiarity with the cabin interior, which will tend to mitigate the need for direct view.

The FAA has considered the requirement for direct view in the context of private use airplanes, and agrees that much of the requirement is based on air carrier type operations. The practicality of locating flight attendant seats near emergency exits, and so that there

is a direct view of occupants inside of rooms, is questionable at best. In this regard, the FAA does believe that some relief may be appropriate for airplanes intended for private use. The FAA notes that the requirement for direct view is not limited to observation of passengers that are not familiar with the interior, however. Flight attendant seats should be located so that there is a direct view provided for the cabin area that is practical. Flight attendant seats should not face away from the cabin, for example. Where flight attendant seats are not required, there is no issue. In this case, the FAA notes that the flight attendant seats that are installed generally do face the cabin and satisfy the objective noted above.

In considering the need for direct view, the FAA agrees that the restricted nature of the operation of a private use airplane mitigates much of the need. That is, the operator has control of, and can restrict, the population of passengers, unlike an air carrier. The risk of passengers engaging in hazardous or malicious activity is essentially eliminated, and the need for direct view is limited to those cases where passengers might need assistance. As noted above, the flight attendant seats currently provided satisfy this requirement, and the only area not within direct view is inside of the rooms.

Floor Proximity Escape Path Marking:

The petitioner has also requested exemption from the requirements for floor proximity escape path marking, as they relate to identification of the escape path along the cabin aisle floor, inside of rooms. The requirement to be able to visually identify the exits when light sources above four feet are obscured would be retained.

The FAA understands the difficulty in marking a “path” inside of a room, when there may be more than one specific path out of the room, depending upon the location of the passenger. In this case, the traditional path is not provided, and therefore cannot be marked in the traditional manner. Considering that this approach is limited to rooms, and would not affect occupants of the airplane in general, the FAA believes that an alternative means of compliance is appropriate. However, the FAA does not believe that the occupants of rooms should be without floor proximity escape path marking. In prior discussions with the petitioner, the FAA understands that the intent of the requirement will be met. Therefore, an exemption is not necessary in this case, as the proposal really only results in a means of compliance different from that normally used in air carrier arrangements. The FAA can accept other means of compliance within the scope of the existing regulations. The FAA would expect that there would be markings at the exit to the room, and elsewhere sufficient for a person to locate that exit.

Interior Doors:

As noted by the petitioner, the regulations regarding interior doors were amended primarily to address doors in transverse partitions. Nonetheless, the concerns with these doors (namely, the potential to obstruct access to emergency exits as well as creating a potential for lack of recognition of exits beyond the door) apply to other types of doors as well. In fact, the current regulations do allow the installation of interior doors, provided passengers are not seated on both sides of the door for takeoff and landing. The FAA is concerned that doors not be located between passengers and exits, and has proposed to prohibit such installations in the future in Notice of Proposed Rulemaking 96-9, "Miscellaneous Cabin Safety Changes."

The FAA recognizes that there are differences in the operation of executive/private use airplanes, and those used for commercial transport. Part 25, however, makes no such distinctions. Certain requirements have passenger capacity discriminants as part of the regulation itself, but this is not related to how the airplane will be utilized. In addition, the regulations related to interior doors do not contain such a provision. That notwithstanding, the FAA does acknowledge that private use airplanes have at least the potential to address requirements on the basis or characteristics peculiar to that type of operation and passenger complement.

The petitioner's discussion of the adequacy of the structural requirements, to assure that a properly positioned door will remain in position following a minor crash landing, accurately summarizes the requirements. Clearly, since the regulations currently allow the installation of some doors under these provisions, they are considered adequate. Jamming of doors, however, is not limited to doors that have been properly positioned. Neither does it exclude the potential for the door to jam before it can be properly positioned (due to mechanical failure, for example). The doors envisioned by the current regulations are more limited, more likely to be under direct crewmember control, and thus not as subject to these concerns. It is correct, however, that the rules do not make a distinction for the type of door, its orientation, or its location within the cabin. The FAA acknowledges that these factors may have a bearing on the reliability of the restraint means, as well as the procedures to ensure that the door is, and can be, open for taxi, takeoff, and landing.

With respect to the possibility that a door will remain closed when it should not be, the FAA believes that a higher level of awareness is required to address this issue. Due to the relative complexity of the cabin interior, the FAA does not believe that inspection by flight attendants prior to takeoff and landing is sufficient to verify that interior doors are in their proper position. Consequently, some type of remote indication is considered necessary; the petitioner's proposal to provide remote indication to the flightcrew is considered adequate.

With respect to the integrity of the means used to latch doors open for takeoff and landing, the FAA considers that redundant means are necessary. Each latching means should have the capability of retaining the door in the takeoff and landing position under

the inertia forces of § 25.561. In addition, the FAA believes that the door must be frangible, in the event that it is closed, or closes during an emergency landing. Frangibility may be demonstrated in accordance with the criteria set forth in paragraph 43b(2) of FAA Advisory Circular 25-17, “Transport Airplane Cabin Interiors Crashworthiness Handbook.”

As noted above, the FAA does not consider that all interior doors are equivalent. In the case of doors that open into rooms, for which only the occupants of the rooms must use the door to reach an exit, the necessary criteria are relatively straightforward, and for these types of airplanes approximate the level of safety provided by the regulations. For doors between passenger compartments that must be used by other persons to reach an emergency exit, the FAA has determined that the level of safety cannot be maintained. Therefore, any grant in this regard must be acknowledged in that light.

After considerable deliberation, the FAA has concluded that the installation of interior doors, with certain limitations, can be extended to doors that span the main cabin aisle. In order to maximize the level of safety, the FAA will require that doors installed across the main cabin aisle open and close in a transverse direction. That is, the direction of motion of the door must be at a right angle to the longitudinal axis of the airplane. A “pocket door” is one example of such a design. This will tend to minimize the chance that the inertia forces of an accident could force the door closed.

The segment of the public operating the airplane and comprising the passenger population for these airplanes has requested such provisions, in recognition of the potential change in the level of safety. In reaching this decision, the FAA is aware that this decision is counter to the FAA’s stated intentions in Notice 96-9. Prior to processing the final rule that results from that notice, the FAA will take into account this exemption and amend it accordingly.

Interior Materials:

With respect to the flammability of interior materials, the petitioner has summarized the evolution of the requirements fairly completely. However the discussion regarding the cost of such new requirements is not entirely relevant to this situation. In promulgating such rulemaking, the FAA must first determine that the state of the art allows for it, and then determine the most appropriate way to make the rulemaking applicable. Once the standards for improved materials were developed, it remained to establish an effectivity for implementation. In this case, the issue was to what degree should the rulemaking be made applicable to the *existing fleet*. There was no issue that the new standards should be made applicable to new type design. In the preamble discussion of the cost impact, it is this potential retrofit that was at issue. That the FAA ultimately did not mandate a fleet retrofit is reflective of the cost/benefit studies done in support of, and subsequent to, the rulemaking. At issue here is whether the rule should be applied to certain airplanes that quite simply are designed with materials that do not comply.

In promulgating the rulemaking, the FAA did, in fact, incorporate a discriminant based on passenger capacity. This was intended to address smaller airplanes, where the ratio of exits to passengers is typically quite good, and where the evacuation times are expected to be quite low. Under these conditions, the benefits of improved materials were expected to be negligible. The airplane type discussed in the petition was not envisioned by the rulemaking, insofar as the large size with low passenger count is concerned. The FAA has considered the issue of the evacuation capability of the airplane, relative to the flammability of the materials, and believes that there may be some relief possible. However, the issue of flammability is not limited to post-crash scenarios, and the inflight fire threat must also be addressed. The FAA notes that the petitioner has not proposed an alternative criteria, but rather an exemption from the requirement to assess the heat release and smoke emissions of materials altogether.

Since the main benefit of improved interior materials is to lengthen the time available for evacuation, an arrangement that effectively provides the same evacuation capability would satisfy much of the concerns addressed by the requirement, albeit indirectly. The FAA has reviewed the full-scale fire test data used to develop the heat release requirements, as well as considered accident data relevant to this issue. This review is not complete, but it does suggest that a quantifiable improvement in evacuation capability could warrant a relaxation of the heat release requirements. The FAA notes that the petitioner's estimate of the improvement in evacuation time offered by the reduced passenger capacity relative to the exit arrangement is, in fact, only marginally lower than that actually demonstrated by the original manufacturer, with a maximum passenger capacity. In reviewing both evacuation and fire test data, the FAA has concluded that a one-minute improvement in evacuation time over that allowed by the regulation would be required to relax the heat release and smoke emissions standards and maintain approximately the *same* level of safety. That is, a particular arrangement would have to show an evacuation capability of 30 seconds. The FAA arrived at this evacuation time by reviewing the full-scale fire test data used to establish the requirements for interior materials, applying the increase in survival time to actual accidents, and relating that improvement to the relative evacuation performance under demonstration conditions.

The petitioner has proposed a time limit of 70 seconds to compensate for not having materials that comply with the heat release and smoke emissions requirements of § 25.853. While the FAA does not agree that a 70-second evacuation standard would represent a meaningful improvement in survivability, the proposal does indicate the petitioner's impression of the difficulty of meeting alternative requirements. In addition, the compensating features cited by the petitioner are largely not enforceable, and therefore cannot be established as limitations for which credit can be given. Nonetheless, considering the apparent magnitude of demonstrating a 30-second evacuation time, the FAA will require an evacuation time of 45 seconds, when compliance is not shown with the heat release and smoke emissions requirements of § 25.853.

The FAA has determined that a 45-second evacuation time would provide for a higher level of safety than is provided on some earlier certificated airplanes, where compliance with the heat release and smoke emissions requirements is not required. It should be noted that, if the public interest is sufficient, an equivalent level of safety need not be shown, as long as safety is not adversely affected. Since many airplanes used for private operation are not required to meet the improved material standards at all, a reduction in the evacuation time could actually be said to represent a higher level of safety as compared to one of those airplanes.

The remaining issue of the inflight fire scenario needs to be addressed as well. The major issue with respect to inflight fires is timely recognition. On some airplanes, the interior includes remote areas that do not lend themselves to timely detection of a fire. This condition is exacerbated by the installation of interior doors that can partition the airplane into a greater number of isolated areas. On this particular interior, the main such areas are rooms in the forward part of the cabin, and the medical room aft of station 1545. In order to address the inflight case, the FAA has determined that installation of a fire detector in these areas, which complies with § 25.858, would compensate for the potential for an increased inflight fire threat. While this section is written for cargo compartment fire detection systems, the criteria contained therein are considered appropriate to this application.

General:

With respect to interior doors and interior materials, these grants of exemption cannot be said to provide the same level of safety that would be afforded were there strict compliance with the regulations. However, the resultant level of safety is consistent with other private use airplanes. For example, the majority of transport category airplanes used in private operation are not required to comply with the heat release and smoke emissions regulations, by virtue of their earlier certification bases. With respect to interior doors, if the compartments separated by doors are looked at individually, the resultant interior arrangements are typically (although not exclusively) quite similar to small private use airplanes that only require a single pair of exits. In addition, the level of safety that results from this exemption is specifically requested and desired by that segment of the public, namely the owners, that will fly on these airplanes. The FAA also notes that no other parties have expressed an interest in this petition.

Nonetheless, there exists the possibility that persons will be carried as passengers on these airplanes who, by virtue of their employment or some other relationship to the airplane's owner, may be compelled to fly. These persons will not be aware of the specific grants of exemption, and might assume that these airplanes were effectively equivalent to a commercial operator. For this reason, the FAA considers that it is necessary for each passenger to be made aware that the particular airplane does not comply with all of the occupant safety standards mandated for the airplane type in general. The FAA will allow the operator to determine how best to accomplish this notification, but will require that procedures be developed whereby each passenger is so

informed, prior to flying on the airplane for the first time. The notification to any individual need only be accomplished once.

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest and will not adversely affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in 49 U.S.C. 40113 and 44701, delegated to me by the Administrator (14 CFR § 11.53), the petition of Raytheon E-Systems for an exemption from the requirements of §§ 25.365(e)(2) and 25.562(c)(2)-(4) and (6) is denied. The FAA has determined that an exemption from the requirements of § 25.812(e)(1) is not necessary. The petition for exemption from the requirements of §§ 25.785(h)(2), 25.813(e), and 25.853 (d), to allow the installation of flight attendant seats that do not provide direct view of the cabin, to allow installation of interior doors, and to install interior materials that do not comply with the heat release and smoke emissions requirements on a Boeing 777 airplane, is hereby granted, as is an exemption from § 25.785(b) to address side-facing divans, with the following provisions, as applicable:

1. The airplane is not operated for hire, or offered for common carriage.
2. It must be shown that occupants of side-facing divans will not experience a Thoracic Trauma Index (TTI) of greater than 85 (as defined in 49 CFR Part 572, Subpart F--TTI data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) Part 571.214, section S6.13.5), or a lateral pelvic acceleration greater than 130g's under the conditions of § 25.562. In addition, occupants may not experience significant body to body contact.
3. Restraint system loads, as specified in § 25.562(c)(4), may not be exceeded for occupants of side-facing seats.
4. A majority of flight attendant seats must be oriented to face the passenger cabin.
5. Each door between passenger compartments must be frangible.
6. Each door between passenger compartments must have a means to signal to the flightcrew when the door is closed. Appropriate procedures/limitations to ensure that takeoff and landing is prohibited, when any such door is not in the proper takeoff and landing configuration, must be established.
7. Each door between passenger compartments must have dual means to retain it in the open position, each of which is capable of reacting the inertia loads specified in § 25.561.
8. Doors installed across a longitudinal aisle must translate laterally to open and close.
9. When materials are installed that do not comply with the requirements of appendix F, parts IV and V, it must be shown that the passengers and crewmembers can be evacuated in 45 seconds or less, under the conditions described in part 25, appendix J.
10. There must be means, that meets the requirements of § 25.858(a)-(d), to signal the flightcrew in the event of a fire in the following areas:

- a. The medical room/bedroom
- b. The forward VIP office
- c. The forward VIP bedroom

11. When the airplane does not comply with the occupant safety requirements of appendix F, parts IV and V, or when doors are installed in specified egress paths, each passenger must be so informed. This notification is only required prior to the first time a person is a passenger on the airplane.

Issued in Renton, Washington, on April 1, 1999

/s/ John J. Hickey
John J. Hickey
Acting Manager
Transport Airplane Directorate
Aircraft Certification Service, ANM-100